

Claims

What is claimed is:

1. A suspension system for in-line skates comprising:

a wheel support member for rotatably supporting one or more wheels of an in-line skate of the type wherein each skate has a boot and plurality of wheels attached to the bottom of the boot;

5 attaching means for pivotally attaching said wheel support member at a pivot point to the bottom of the skate boot and allowing said wheel support member to move horizontally relative to the boot at the pivot point; and

10 shock absorbing means located between the boot bottom and said wheel support member for cooperating with said attaching means so that said shock absorbing means is engaged when said wheel support member pivots at the pivot point or moves relative thereto.

2. A suspension system as claimed in claim 1 wherein said attaching means allows said wheel support member to move horizontally and vertically relative to the boot at the pivot point.

3. A suspension system as claimed in claim 1 wherein said attaching means allows said wheel support member to move at the pivot point in any direction in the vertical plane in which the wheels rotate.

4. An improved suspension system for in-line skates of the type wherein each skate has a boot and plurality of wheels attached to the bottom of the boot, wherein the improvement comprises:

a wheel support member for rotatably supporting one or more wheels of an in-line skate;

attaching means having cooperating male and female portions for attaching said wheel support member to the bottom of the boot, said female portion defining a hole for receiving said male portion and allowing said male portion to move within the hole so that said wheel support member is capable of moving horizontally and vertically relative to the boot; and

shock absorbing means located between the boot bottom and said wheel support member for cooperating with said attaching means so that said shock absorbing means is engaged when said male portion moves within the hole of said female portion.

5. An improved suspension system as claimed in claim 4 wherein said male portion of said attaching means is rigidly affixed to the bottom of the boot.

6. An improved suspension system as claimed in claim 5 wherein said male portion of said attaching means is integral with the bottom of the boot.

7. An improved suspension system as claimed in claim 5 wherein the hole defined by said female portion is defined in said wheel support member.

8. An improved suspension system as claimed in claim 5 wherein said female portion is rigidly affixed to said wheel support member.

9. An improved suspension system as claimed in claim 4 wherein said male portion of said attaching means is rigidly affixed to said wheel support member.

10. An improved suspension system as claimed in claim 9 wherein said male portion is integral with said wheel support member.

11. An improved suspension system as claimed in claim 9 wherein the hole defined by said female portion is defined in the bottom of the boot.

12. An improved suspension system as claimed in claim 9 wherein said female portion defining said hole is rigidly affixed to the bottom of the boot.

13. A suspension system as claimed in claim 1 wherein said bottom of the boot includes a sole plate to which said wheel support means is pivotally attached by said attaching means.

14. An improved suspension system as claimed in claim 9 wherein the female portion includes a center support spine extending downwardly boot bottom, the support spine defining a slotted hole laterally therethrough, and wherein the top portion of the wheel support member has

a pair of dowel pins with holes therethrough extending laterally across a portion of the wheel support member, and wherein said male portion includes pin means pivotally interconnecting the dowel pins to the support spine to allow pivoting of the wheel support member around the pin and horizontal and vertical movement of the pin within the slotted hole.

15. An improved suspension system as claimed in claim 5 wherein said attaching means comprises a pair of flanges extending downwardly from the boot bottom, the flanges each having a flange hole extending laterally therethrough in mating opposition, and wherein said female portion defines a pair of aligned slotted holes extending laterally through a pair of spaced side walls of the top of the wheel support member, and wherein said male portion includes pin means pivotally interconnecting the side walls to the flanges to allow pivoting of the wheel support member around the pin and horizontal and vertical movement of the pin within the slotted holes.

and the top portion of the wheel support member having a slotted hole laterally through each of the side walls in mating opposition, and a pin means pivotally interconnecting the side walls to the flanges to allow pivoting of the wheel support member around the pin and movement of the pin within the slotted hole.

16. A suspension system as claimed in claim 1 wherein said shock absorbing means comprises compressible material.

17. A suspension system as claimed in claim 1 further comprising a guard rigidly

attached to the skate boot bottom by a connecting means and extending downwardly therefrom around the suspension system to cover and protect the suspension system.

18. An improved in-line skate of the type having a boot and plurality of wheels attached to the bottom of the boot, wherein the improvement comprises:

a front and a rear suspension system, each of which includes:

a wheel support member for rotatably supporting one or more wheels of the in-line skate;

attaching means for pivotally attaching said wheel support member at a pivot point to the bottom of the boot and allowing said wheel support member to move horizontally relative to the boot at the pivot point; and

shock absorbing means located between the boot bottom and said wheel support member for cooperating with said attaching means so that said shock absorbing means is engaged when said wheel support member pivots at the pivot point or moves horizontally relative to the boot at the pivot point.

19. An improved in-line skate as claimed in claim 18 wherein said wheel support members of said front and rear suspension systems are respectively referred to as said front and rear wheel supports and wherein said improved skate further comprises a brake having a brake element for contacting the rear wheel of the skate to brake said rear wheel, said brake having first pivoting means attached to the rearward end of the skate boot and second pivoting means attached to said rear wheel support and wherein said first and second pivoting means cooperate to

(1) move the brake element into contact with the rear wheel when the skater shifts his or her weight so that more weight is placed on said rear wheel support than on said front wheel support, and (2) allow the brake element to move in conjunction with said rear wheel support and thereby stay out of contact with the rear wheel when the skater's weight is distributed equally to the front and rear wheel supports.

20. An improved in-line skate as claimed in claim 19 further comprising brake sensitivity means for adjusting the minimum amount of weight which the skater has to place on said rear wheel support to move said brake element into contact with the rear wheel.

21. An improved in-line skate as claimed in claim 18 wherein said front wheel support supports at least two in-line wheels.

22. An improved in-line skate as claimed in claim 18 wherein said attaching means allows said wheel support members to move horizontally and vertically at the pivot point in the plane in which the wheels rotate.

23. An improved in-line skate as claimed in claim 18 wherein said attaching means allows said wheel support members to move at the pivot point in any direction in the plane in which the wheels rotate.

24. An improved in-line skate as claimed in claim 18 further comprising a link

member pivotally connecting said front and rear wheel supports, said link member serving to keep said wheel supports aligned so that wheels attached thereto stay in alignment.

25. An improved in-line skate as claimed in claim 24 wherein said link member permits vertical and horizontal movement of said wheel supports in the vertical plane in which the wheels rotate but restrains lateral movement of said wheel supports so that said wheel supports and wheels thereof stay in alignment.

26. A compound suspension system for inline skates enabling independent shock absorption for each wheel, which compound suspension system is attachable to a bottom of a skate boot, the system comprising:

wheel support means comprising at least one pivotable wheel support member attached to the skate boot by a multiple movement means comprising a receiving element provided with at least one combined vertical and horizontal slot and a pivotable element inserted movably within the receiving element so that the pivotable element is capable of vertical, horizontal, and pivotal movement within the receiving element, the pivotable wheel support member having means to support at least two wheels rotatably therein; and

shock absorbing means attached between the skate boot and the at least one pivotable support member in communication therewith, so that movement of the wheel support member caused by the wheels passing over variable terrain is absorbed by the shock absorbing means.

27. The suspension system of claim 26 wherein the wheel support means comprises a front and a rear pivotable wheel support member each having a top portion attached to the sole plate by the multiple movement means and each having a bottom portion with a pair of wheels rotatably attached thereto and further comprising a rigid link member attached by pivotable means between the bottom portions so that each wheel is capable of being moved independently to pivot the wheel support member to engage the shock absorbing means.

28. The suspension system of claim 27 wherein each of the wheel support members further comprises a pair of side walls spaced apart to receive each of the skate wheels therebetween with a rotatable interconnecting means and a horizontal element rigidly interconnecting the two side walls, the horizontal element configured to engage the shock absorbing means.

29. The suspension system of claim 27 further comprising a brake having a brake element capable of contacting one of the skate wheels to brake the wheel, the brake being attached to the rearward end of the skate by pivotable and vertically moving means and to the rear wheel support by pivotable means so that the brake element is capable of (1) pivoting the brake element into contact with the rear wheel when the skater shifts his or her weight so that more weight is placed on said rear wheel support than on said front wheel support, and (2) allowing the brake element to move vertically in conjunction with said rear wheel support and thereby stay out of contact with the rear wheel when the skater's weight is distributed equally to

the front and rear wheel supports.

30. The suspension system of claim 29 wherein the pivotable and vertically moving means comprises a bracket rigidly attached to one end of the skate boot, the bracket defining an elongated slot receiving a pivotable element of said brake which allows said brake and brake element to move vertically within the slot in response to wheel support movement caused by changes in terrain.

31. The suspension system of claim 29 wherein brake element fits adjustably within a housing of said brake so that the proximity of the brake element to the surface of the wheel is adjustable.

32. The suspension system of claim 29 wherein said brake element includes a high friction material.

33. The suspension system of claim 28 further comprising a sole plate attachable to a bottom of the skate boot, wherein the multiple movement means comprises a thick center support spine extending downwardly from the sole plate, the support spine having a vertically and horizontally slotted hole laterally therethrough, and the top portion of the wheel support member having a pair of dowel pins with holes therethrough extending laterally across a portion of the wheel support member, and a pin means pivotally interconnecting the dowel pins to the support spine to allow pivoting of the wheel support member around the pin and movement of the pin

within the slotted hole.

34. The suspension system of claim 28 further comprising a sole plate attachable to a bottom of the skate boot, wherein the multiple movement means comprises a pair of flanges extending downwardly from the sole plate, the flanges each having a flange hole laterally therethrough in mating opposition, and the top portion of the wheel support member having a slotted hole laterally through each of the side walls in mating opposition, and a pin means pivotally interconnecting the side walls to the flanges to allow pivoting of the wheel support member around the pin and movement of the pin within the slotted hole.

35. The suspension system of claim 28 wherein the shock absorbing means comprises a wedge-shaped bumper formed of compressible material and each of the wheel support members further comprises a V-shaped cradle on the top portion for receiving the wedge-shaped bumper therein, the V-shaped cradle having an upwardly angled outer surface and an upwardly angled inner surface connected thereto, so that as each of the wheels moves in response to changing terrain, the wheel support member is capable of pivoting, moving vertically and moving horizontally to compress the wedge-shaped bumper.

36. The suspension system of claim 35 wherein the wedge-shaped bumper is provided with at least one hollow core extending transversely across the wedge-shaped bumper and further comprising a compressible core insert which is insertable in the hollow core so that the core insert alters the compressibility of the wedge-shaped bumper.

37. The suspension system of claim 35 wherein the wedge-shaped bumper is provided with two hollow cores, each of the cores positioned in proximity to one of the upwardly angled surfaces of the V-shaped cradle, and further comprising a pair of core inserts interconnected by a handle portion, the pair of core inserts capable of being inserted in the two hollow cores.

38. The suspension system of claim 37 wherein the core insert comprises an air-filled bladder.

39. The suspension system of claim 37 wherein the core insert further comprises a pump in communication with the air-filled bladder, the pump capable of pumping air into the air-filled bladder.

40. The suspension system of claim 28 wherein the inner portion of the wheel support portion comprises two holes in each of the side walls, one of the holes positioned higher than the other to receive a rotating means of attaching an inner wheel in a higher position than an wheel for a rocking effect.

41. The suspension system of claim 28 wherein the shock absorbing means comprises a front and rear compressible bumper attached to the sole plate and in communication with the front and rear wheel supports.

42. The suspension system of claim 41 further comprising an inner compressible bumper attached to the sole plate and in communication with the rigid link.

43. The suspension system of claim 26 wherein the support system comprises a single pivotable wheel support member having an upper portion attached at a central point to the sole plate by a pivotable means and having two end portions each communicating with a bumper/shock attached between the single pivotable wheel support member and the sole plate.